

Influence of mycotoxin detoxifying agents on the plasma pharmacokinetics and tissue residues of amoxicillin and oxytetracycline in poultry

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Mycotoxin-detoxifying agents are frequently used feed additives for reduction of mycotoxicoses. Depending on their mode of action, the detoxifiers are divided in two different classes: adsorbing and biotransforming agents. The first ones are able to bind mycotoxins, the second ones have the ability to degrade mycotoxins. In poultry, amoxicillin and oxytetracycline are frequently administrated in the drinking water for the treatment of bacterial diseases. Mycotoxin-detoxifying agents possibly could interact with the pharmacokinetics of these antibiotics. To confirm this hypothesis, following experiment was conducted. Forty-eight 1-day-old Ross chicks were brooded under standard husbandry conditions. After one week acclimatization the animals were divided into six groups, each group consisting of eight animals. The chickens were fed diets containing no detoxifying agent (group 1 and 2), an adsorbing agent (group 3 and 4) or a biotransforming agent (group 5 and 6). After three weeks of feeding, a kinetic study of oxytetracycline was performed in group 1, 3 and 5 (Table 1).

Table 1. Timetable of the critical events of the animal experiments with oxytetracycline

Day in the study	D28	D29-33	D34	D35
8 a.m.	Oral bolus oxytetracycline (100 mg/kg B.W.), followed by a kinetic study during 24 hours	Oral bolus oxytetracycline (50 mg/kg B.W.) Oxytetracycline in water (100 mg oxytetracycline/kg B.W.)	Oral bolus oxytetracycline (50 mg/kg B.W.) Refreshing of the medicated water (100 mg oxytetracycline/kg B.W.)	Euthanasia of the animals 16 hours after withdrawal of medicated water and collection of liver and kidneys
8 p.m.		Refreshing of the medicated water (100 mg oxytetracycline/kg B.W.)	Unmedicated water	

Day in the study	D28	D29-31	D32	D33
8 a.m.	Oral bolus amoxicillin (20 mg/kg B.W.), followed by a kinetic study during 10 hours	Oral bolus amoxicillin (10 mg/kg B.W.) Refreshing of the medicated water (20 mg amoxicillin/kg B.W.)	Oral bolus amoxicillin (10 mg/kg B.W.) Refreshing of the medicated water (20 mg amoxicillin/kg B.W.)	Euthanasia of the animals 12 hours after withdrawal of medicated water and collection of liver and kidneys
8 p.m.	20 mg amoxicillin/kg B.W. added in the water	Refreshing of the medicated water (20 mg amoxicillin/kg B.W.)	Unmedicated water	

A similar experiment was performed for amoxicillin in group 2, 4 and 6 (Table 2).

Table 2. Timetable of the critical events of the animal experiments with amoxicillin

The concentration of both antibiotics in plasma and tissues was determined by validated LC-MS/MS methods. Plasma pharmacokinetic parameters ($AUC_{0-\infty}$, AUC_{0-t} , C_{max} , T_{max} , $T_{1/2}$) were calculated using WinNonlin. The results of this experiment will be presented at the conference.

Acknowledgements: The study was supported by the BOF-project N^o 01J08309 from Ghent University. The assistance of J. Lambrecht en A. Van den Bussche is gratefully appreciated.

References

EFSA, 2009. Review of mycotoxin-detoxifying agents used as feed additives: mode of action, efficacy and feed/food safety. The European Food Standard Agency (EFSA).